Application No. 10/802,130

Amendments to the Drawings:

Applicants have made amendments to Figure 5 to show a thorough description of elements 110 through 160 as described in the specification. A revised drawing is included with the amendment.

Remarks

Applicants thank the Examiner for his careful consideration of the application.

Claims 1 – 28 are pending in the application. The Applicant had a telephone conference with the Examiner on November 5, 2007. Claims 1 and 23 were discussed, but no agreement was reached. Applicants believe the rejections to these claims to be inapt. Ultimately, it was agreed that Applicants' representative would submit arguments in a formal written response.

Drawings Objections

The Examiner objected to the drawings under 37 CFR 1.83(a) because FIG. 5 fails to show a thorough description of elements 110 through 160. A corrected drawing sheet for claim 5 is enclosed along with this response.

The Examiner objected to the drawings under 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description "50". Applicants have amended paragraph 29 of the specification so that reference numeral 50 is included.

Specification Objections

The Examiner objected to the specification for not containing headers, each for a corresponding section of the disclosure. Applicants appreciate the Examiner's desire. However, use of headers in an application is optional and Applicants choose not to use headers in every section. Applicants note that the sections of the application are arranged in the order stated in 37 CFR 1.77(b).

Claim Objections

The Examiner objected to claims 5 and 28.

Applicants have amended claim 5 to overcome the Examiner's objection.

The Examiner objected to claim 28 for "failing to conform to the invention as set forth in the remainder of the specification." The purpose of the present invention was to

improve color-to-grayscale transformations to improve the visibility of edges between objects of similar luminance but different colors. Applicants believe a claim directed to edge enhancement sufficiently conforms to the invention set forth in the application. However, if the Examiner considers edge enhancement to be a separate invention from color-to-grayscale conversion, Applicants would not object to a restriction.

Claim Rejections – 35 USC §101

The Examiner rejected claims 10 and 23 under 35 USC §101 as being "directed to non-statutory subject matter." Claim 10 is a product by process claim that has been amended to better define the concepts claimed and claim 23 has been canceled.

The Examiner rejected claims 1, 3 – 10, and 22 under 35 USC §101 as being directed to non-statutory subject matter because the claimed invention is directed to a judicial exception and is not directed to a practical applicant of such judicial exception. Applicant has amended claim 1 and claim 22 to include the limitation of claim 2.

Claim Rejections - 35 USC §102

The Examiner rejected claims 1 – 4, 9, 11 – 13, 19, and 22 under 35 USC §102(b) as being anticipated by Weston (US Patent No. 5,434,627 A) ("Weston"). Applicants respectfully traverse these rejections.

In claim 1, Applicants recite a method, that includes modifying a luminance component of the color image based upon at least one high pass filtered chrominance component, and generating a monochrome output image based upon the modified luminance component.

In claim 11, Applicants recite a system for converting a color image to a grayscale image. The system includes a feedback unit operably connected to the edge detector, wherein the feedback unit modifies the luminance component based upon the high-pass filtered chrominance components, and an output device operably connected to the feedback unit, wherein the output device receives the modified luminance

component and outputs a grayscale image based upon the modified luminance component.

In claim 22, Applicants recite a method that includes modifying a luminance component of a color image based upon a weighted combination of the chrominance components, and generating a monochrome output image based upon the modified luminance component.

The Examiner should withdraw the rejection to claims 1, 11, and 22 as the Examiner has not established that any of these claims are anticipated by Weston under 35 USC §102(b). Weston must show each of the elements of Applicants' claimed method to anticipate claim 1, claim 11, or claim 22. The Examiner has not shown that Weston discloses modifying a luminance component of a color image based upon at least one high pass filtered chrominance component or a feedback unit for performing that step. The Examiner asserts that Weston shows a luminance component being adjusted at Adder 152. However, Weston appears to only disclose combining filtered chrominance signals with a filtered luminance signal, thus creating a standard color signal. Combining the signals combines the information contained in both signals and provides a signal containing luminance and chrominance information for each pixel of an image. If the luminance channel were to be split off again, nothing in Weston suggests the chrominance signal would have affected the luminance information in any way. In claims 1, 11, and 22, Applicants claim modifying the luminance signal itself. In the description, a weighted, high-pass filtered chrominance signal is actually added to the luminance signal itself. A monochrome image is then generated and monochrome images are created generally using only the modified luminance signal. The luminance signal is modified by the chrominance signal but the modified signal does not include additional chrominance information separate from that embodied in the luminance signal. For each of the foregoing reasons, claims 1, 11, and 22 should be allowed.

Claims 2 – 4, 9, 12, 13, and 19 should be allowed if claim 1 is allowed, as claims 2 – 4 and 9 depend from claim 1, and claims 12, 13, and 19 depend from claim 11.

The Examiner rejected claim 23 under 35 USC §102(b) as being anticipated by Balasubramanian et al. (Gamut Mapping to Preserve Spatial Luminance Variations, The Journal of Imaging Science and Technology September/October 2001, vol. 45, no. 5; p. 436-443) ("Balasubramanian"). While Applicants disagree with the Examiner's rejections, Applicants have canceled claim 23.

The Examiner rejected claim 10 under 35 USC § 102(b) as being anticipated by Kamada et al. (US Patent No. 6,347,156 B1) ("Kamada"). Applicants respectfully traverse this rejection. Applicants have amended claim 1 to add sufficient detail such that Kamada clearly does not anticipate it. Specifically, for example, the Examiner has not shown that Kamada discloses any grayscale images with enhanced edges.

The Examiner rejected claim 28 under 35 USC §102(b) as being anticipated by Hamilton, Jr. et al. (US Patent No. 6,259,822 B1) ("Hamilton"). Applicants respectfully traverse this rejection.

In claim 28, Applicants recite a method for enhancing edges between a first object and a second object in a grayscale image created from a color image. The method includes darkening the first object near an edge between the two objects and lightening the second object near the edge between the two objects as a function of the original color edge strength.

The Examiner should withdraw the rejection to claim 28 as the Examiner has not shown that Hamilton shows all the limitations of claim 28. Specifically, the Examiner has not shown lightening a first object and darkening a second object in a grayscale image based upon the difference in colors between the first and second object prior to conversion to grayscale ("the original color edge strength"). The conversion in Hamilton appears to be a standard color-to-grayscale conversion and the enhancements appear to be performed after conversion. Therefore, the Examiner has not shown that Hamilton anticipates claim 28.

Claim Rejections – 35 USC §103

The Examiner rejected claims 8 and 17 under 35 USC §103(a) as being unpatentable over Weston in combination with Daly et al. (US Patent No. 5,987,169 A) ("Daly"). These rejections are respectfully traversed. Applicants have already argued that claims 1 and 11 should be allowed over Weston. The Examiner has not shown that Daly overcomes the deficiencies of Weston. Therefore, claims 8 and 17 should be allowed if claims 1 and 11 are allowed.

The Examiner rejected claim 18 under 35 USC §103(a) as being unpatentable over Weston in combination with Lee et al. (US Patent No. 5,012,333 A) ("Lee"). This rejection is respectfully traversed. Applicants have already argued that claim 11 should be allowed over Weston. The Examiner has not shown that Lee overcomes the deficiencies of Weston. Therefore, claim 18 should be allowed if claim 11 is allowed.

The Examiner rejected claim 20 under 35 USC §103(a) as being unpatentable over Weston in combination with Berstis (US Patent No. 6,518,948 B1) ("Berstis"). This rejection is respectfully traversed. Applicants have already argued that claim 11 should be allowed over Weston. The Examiner has not shown that Berstis overcomes the deficiencies of Weston. Therefore, claim 20 should be allowed if claim 11 is allowed.

The Examiner rejected claim 21 under 35 USC §103(a) as being unpatentable over Weston in combination with Yanaka (US Patent No. 6,115,138 A) ("Yanaka"). This rejection is respectfully traversed. Applicants have already argued that claim 11 should be allowed over Weston. The Examiner has not shown that Yanaka overcomes the deficiencies of Weston. Therefore, claim 21 should be allowed if claim 11 is allowed.

The Examiner rejected claims 24 - 27 under 35 USC § 103(a) as being unpatentable over Hamilton in combination with Weston. Applicants respectfully traverse these rejections.

In claim 24, Applicants recite a method for enhancing edges of objects in an image in a color to grayscale conversion, wherein the color image includes a plurality of pixels. The method includes modifying a luminance component of a subset of the plurality of pixels based upon the chrominance information of those same pixels, and

generating an output image based upon the adjusted luminance component. The subset of the plurality of pixels are those pixels that are proximate to an edge between one object and another and pixels not proximate to the edge are not adjusted.

The Examiner should withdraw the rejection to claim 24 as the Examiner has not shown that the combination of Hamilton and Weston shows all the limitations of claim 24. Specifically, the Examiner has not shown that either reference discloses modifying pixels proximate to an edge between one object and another based upon the chromatic information of those same pixels. Hamilton appears to show simple post-conversion enhancement and the Examiner has not identified where Weston discloses such a limitation. The Examiner asserts that if a color component has been changed, the luminance component will change as well. However, the Examiner has not shown where either reference discloses using chrominance components to adjust the luminance component of a pixel. Adjusting "color" is typically done in a non-L*a*b* space where luminance and chrominance components are mixed. When a color is adjusted it can change both luminance and chrominance components simultaneously. The Examiner has not shown modifying the luminance components of a subset of pixels proximate to an edge based upon the chrominance information of those pixels. Therefore the Examiner has not shown that claim 24 is obvious over the combination of Hamilton and Weston.

In claim 25, Applicants recite a method for improving a color to grayscale transformation of an image composed of a plurality of pixels. The method includes selecting a subset of the plurality of pixels based upon at least one predetermined criterion derived from a local spatial neighborhood of the plurality of pixels, modifying the luminance components of each of the subset of the plurality of pixels based upon the chrominance information of the same plurality of pixels, and generating an output image based upon the modified luminance component.

The Examiner should withdraw the rejection to claim 25 as the Examiner has not shown that the combination of Hamilton and Weston shows all the limitations of claim 25. Specifically, the Examiner has not shown that either reference discloses modifying

18

the luminance components of each of a subset of the plurality of pixels based upon the chrominance information of the same plurality of pixels, where the subset was chosen based upon a predetermined criterion derived from a local spatial neighborhood of the plurality of pixels. Hamilton appears to show simple post-conversion enhancement and the Examiner has not identified where Weston discloses such a limitation. The Examiner asserts that if a color component has been changed, the luminance component will change as well. However, the Examiner has not shown where either reference discloses using chrominance components to adjust the luminance component of a pixel. Adjusting "color" is typically done in a non-L*a*b* space where luminance and chrominance components are mixed. When a color is adjusted it can change both luminance and chrominance components simultaneously. The Examiner has not shown modifying the luminance components of a subset of pixels proximate to an edge based upon the chrominance information of those pixels. Therefore the Examiner has not shown that claim 25 is obvious over the combination of Hamilton and Weston.

Claim 26 should be allowed if claim 25 is allowed as claim 26 depends from claim 25.

In claim 27, Applicants recite a method for improving a color to grayscale transformation of an image composed of a plurality of pixels. The method includes determining which of the plurality of pixels are in close proximity to an edge, modifying the luminance components of each of the subset of the plurality of pixels based upon chrominance information from the same plurality of pixels, and generating an output image based upon the modified luminance component.

The Examiner should withdraw the rejection to claim 27 as the Examiner has not shown that the combination of Hamilton and Weston shows all the limitations of claim 27. Specifically, the Examiner has not shown that either reference discloses modifying the luminance components of each of a subset of a plurality of pixels based upon chrominance information from the same plurality of pixels. Hamilton appears to show simple post-conversion enhancement and the Examiner has not identified where Weston discloses such a limitation. The Examiner asserts that if a color component has

19

been changed, the luminance component will change as well. However, the Examiner has not shown where either reference discloses using chrominance components to adjust the luminance component of a pixel. Adjusting "color" is typically done in a non-L*a*b* space where luminance and chrominance components are mixed. When a color is adjusted it can change both luminance and chrominance components simultaneously. The Examiner has not shown modifying the luminance components of a subset of pixels proximate to an edge based upon the chrominance information of those pixels. Therefore the Examiner has not shown that claim 27 is obvious over the combination of Hamilton and Weston.

Allowable Subject Matter

Claims 5 – 7 and 14 – 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants have rewritten the claims in independent form, so they should be allowable.

Conclusion

No additional fee is believed to be required for this amendment. However, the undersigned Xerox Corporation attorney hereby authorizes the charging of any necessary fees, other than the issue fee, to Xerox Corporation Deposit Account No. 24-0025. This also constitutes a request for any needed extension of time and authorization to charge all fees therefor to Xerox Corporation Deposit Account No. 24-0025.

A telephone interview is respectfully requested at the number listed below prior to any further Office Action, i.e., if the Examiner has any remaining questions or issues to address after this paper. The undersigned will be happy to discuss any further Examiner-proposed amendments as may be appropriate.

Respectfully submitted,

/Joseph M. Young, Reg. No. 45248/
Joseph M. Young
Attorney for Applicants
Registration No. 45,248
Telephone (503) 685-4229

JMY/rjh